UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

SCANSOFT, INC., Plaintiff, v. VOICE SIGNAL TECHNOLOGIES, INC., LAURENCE S. GILLICK, ROBERT S. ROTH, JONATHAN P. YAMRON, and MANFRED G. GRABHERR, Defendants.	C.A. No. 04-10353-PBS

ORIGINAL

DEPOSITION OF MANFRED G. GRABHERR, Ph.D., a witness called by and on behalf of the Plaintiffs, taken pursuant to the applicable provisions of the Federal Rules of Civil Procedure, before Dana Welch, CSR, Registered Professional Reporter, and Notary Public, in and for the Commonwealth of Massachusetts, at the offices of Bromberg & Sunstein, 125 Summer Street, Boston, Massachusetts, on June 16, 2005, commencing at 10:04 a.m.

APPEARANCES:

For the Defendants:

CHOATE, HALL & STEWART, P.C.
Exchange Place
53 State Street
Boston, Massachusetts 02109
(617) 248-5000
By: Paul D. Popeo, Esq.

For the Plaintiff:

BROMBERG & SUNSTEIN, LLP
125 Summer Street, 11th Floor
Boston, Massachusetts 02110-1618
(617) 443-9292
By: Lisa Fleming, Esq.

did was --

MR. POPEO: If she has a follow-up question she will ask you.

THE DEPONENT: All right.

BY MS. FLEMING:

Q. So it's your testimony that you were unsure as to whether you had confidential information from previous employers when you joined Voice Signal Technologies?

MR. POPEO: I object. You may answer.

THE DEPONENT: Yes.

BY MS. FLEMING:

Q. Now, it's true, isn't it, that when you worked for Lernout & Hauspie you were involved in developing algorithms for speech recognition; is that true?

A. That is true.

Q. And in the course of your work in developing these algorithms, did you have an understanding about whether the work that you did in that development was confidential?

MR. POPEO: Object to the form of the question. If that was your understanding, you may answer.

THE DEPONENT: I would like to clarify one thing, which is speech recognition and the basic algorithms is an area that's been well understood for a very long time. So the first approach to solve the problem of speech recognition dates back I don't know, maybe three decades or so, probably even longer.

And also, there is this one technique which is called hidden Markov model, which most commercial and open source speech recognition systems use. And that's also been very well understood for a long time.

There are many other things, like the use of a language model to assist large-vocabulary recognition, which is also widely known and published in the public domain and many other things.

So this is, I think important to understand, that if you work on something, then it's not necessarily immediately clear whether you do something that is totally in the public domain or your specific implementation is something that's

proprietary.

BY MS. FLEMING:

Q. And is it your testimony that the specific implementation was not confidential?

MR. POPEO: I object to the form of the question. If you understand that question, you may answer.

THE DEPONENT: So is the question whether the specific implementation was proprietary information?

BY MS. FLEMING:

Q. Yes.

MR. POPEO: Slow down. Are you asking whether he was aware of a proprietary implementation?

BY MS. FLEMING:

Q. Did you understand my question?

A. Can you say it again, please.

MS. FLEMING: Sure can you read it back.

THE REPORTER: "Question: 'And is it your testimony that the specific implementation was not confidential?'"

MR. POPEO: Objection.

THE DEPONENT: No. I can't say that it was not confidential.

BY MS. FLEMING:

Q. Can you say it was confidential?

MR. POPEO: Were you informed that it was confidential?

MS. FLEMING: Mr. Popeo, stop running this deposition or we will terminate it and go to the judge.

THE DEPONENT: Sorry. Say it again, please.

MS. FLEMING: Can you read the question back?

THE REPORTER: "Question: 'Can you say it was confidential?'"

THE DEPONENT: I can't remember a single case in which I could say this is definitely confidential.

BY MS. FLEMING:

Q. Well, tell me about what you developed at Voice Signal -- I'm sorry -- at Lernout & Hauspie that you're not sure was confidential.

MR. POPEO: He's testified he's not sure anything was confidential.

BY MS. FLEMING:

Q. Tell me what you worked on at Lernout & Hauspie that causes you to believe that you're not sure whether it was confidential or not?

MR. POPEO: Object to the form.

BY MS. FLEMING:

Q. Give me an example.

A. Okay. I'll give you an example. One of the problems in speech recognition is the method to score parts of speech against your acoustic models in order to get some measure of how close, you know, a particular sound is with a sound template that you have in the recognizer. And one of the problems is this can take up quite a long time because this is a rather expensive operation.

There are techniques in which -- which allow you to do this faster by using certain approximations. And I remember that in one of Lernout & Hauspie's speech recognizers, there was a method being used that was well published, was in the public domain. But I did a pretty minor modification to it, so make it use less memory. So the two things, whether

the fact that this technique was used was confidential, I don't know. I wasn't sure about that.

Q. Let me stop you there, if I can.

A. Yeah.

Q. And it's a long-winded answer and there's a lot of information in there.

A. Okay.

Q. So let me ask you this: You testified to having recognized that the modeling may have been disclosed in a publication, it may have been publicly known; is that right?

A. Yes.

Q. What was that modeling? Can you describe it for me?

A. It was a technique. It was called short lists.

Q. Short lists?

A. I believe that was title. It might have had a more complicated title, but that's the name by which I remember this.

Q. And your testimony is that that technique of short lists was published?

A. Yes.

Q. And then I believe you said that you made a minor modification to that technique; is that right?

A. Yes.

Q. Okay. And is it your testimony that your minor modification of that technique was not confidential to Lernout & Hauspie?

MR. POPEO: Object to the form of the question. If you understand, you can answer it.

THE DEPONENT: No. What I'm saying is that there are two things here. One is the modification. I can't say for sure whether this is confidential; at the time, I assumed it was.

BY MS. FLEMING:

Q. You did?

A. Yes. The second thing is the fact that this technique was used, I just don't know whether this was confidential information.

Q. You assumed it was, but you don't know; is that --

MR. POPEO: Object.

MS. FLEMING: I just want to understand

his testimony.

MR. POPEO: Object to form. That mischaracterizes the testimony.

THE DEPONENT: Yeah. If there was ever some doubt, I would assume that it's confidential.

BY MS. FLEMING:

Q. And did you treat that minor modification that you made at Lernout & Hauspie as confidential?

A. Yes.

Q. And you never disclosed it to anyone?

A. No.

Q. Did you disclose it to anyone at Lernout & Hauspie?

A. I don't recall. Probably.

Q. And what did your minor modification to the short list do, what did it achieve?

MR. POPEO: Object to the form. Answer the question, if you can.

THE DEPONENT: So from what I remember, I don't remember the specific details, but from what I remember, it reduced the memory usage.

BY MS. FLEMING:

Q. The memory usage for what?

A. For -- this particular technique required you to store certain structures in memory. And this minor modification would simplify this technique a little bit. But it would also save memory so you could fit it into less memory.

Q. And what's the result -- in speech recognition research and development, what's the result of being able to perform that task with less memory?

MR. POPEO: Object to the form of the question. You may answer, if you can generalize and if you understand it.

THE DEPONENT: Can you say it again, please?

MS. FLEMING: Will you read it back, please.

THE REPORTER: "Question: 'And what's the result -- in speech recognition research and development, what's the result of being able to perform that task with less memory?'"

MR. POPEO: Same objection.

THE DEPONENT: In general speech recognition, if it would, in a very straightforward way, and if you use memory techniques that attempt to get you the maximum accuracy for a task like speech-to-text or large-vocabulary recognition, you will end up using a lot of memory because that's -- these algorithms that deal with large amounts of data and you have to keep the data somewhere.

Then in addition, just doing this matching between, you know, speech and your words in the vocabulary and the underlying phonetics, if you don't do anything smart about it, you will end up using very, very much memory and also it will be very slow.

So any attempt, even on relatively small modules to reduce the memory footprint is beneficial and because otherwise, you wouldn't be able to fit it on a regular PC.

BY MS. FLEMING:

Q. And when you say it's beneficial, do

you mean in some commercial sense it's beneficial?

MR. POPEO: Object to the form of the question. If you know the answer, you may answer.

THE DEPONENT: Yes, because ultimately, you don't want speech recognition systems that run on super-high-end computers. You want speech recognition systems that, you know, run on regular PCs; at least that was the goal of Lernout & Hauspie.

BY MS. FLEMING:

Q. And that was an important goal to the company, wasn't it?

MR. POPEO: If you know.

THE DEPONENT: In this -- I don't remember what the fact was of this modification. It was not a major thing. It was not something that would make or break, you know, the ability to run on a PC. But a speech recognition system is a very complex thing and you have many, many different --

BY MS. FLEMING:

Q. I'll agree with you there.

A. -- and you have many different modules or pieces of this thing. And each of them wants to get memory.

So you can not easily do something like say, oh, I'm going to make this one change and I will drop the memory usage by, I don't know, 50 percent. So usually that's not the way this works. You have all these different things and each of one allocates, let's say one megabyte of memory. And if you can get this one megabyte down to 0.8 megabyte, that's good. Then you go on to the next thing, which uses 2 megabytes; you get it down to 1.8 megabytes. But it all adds up. So then you have to go back and say, well, this still needs too much memory, so maybe we can do something else. We have to, I don't know, look for other ways.

Q. And so you would agree with me then that a desired goal of the work in speech recognition would be to reduce memory and at the same time increase accuracy; is that an accurate statement?

MR. POPEO: Object to the form of the question. Compound. Are you asking for him to generalize?

BY MS. FLEMING:

Q. Do you understand the question?

MR. POPEO: Or at Lernout & Hauspie?

BY MS. FLEMING:

Q. Do you understand the question, sir?

A. So you're asking about speech recognition in general?

Q. Yes.

A. Yes. That would be the goal, to have something that uses virtually no memory, is infinitely accurate, and doesn't use CPU resources. But in the real world -- I mean, one would like that, right.

Q. So in terms of the minor modification that you made when you were at Lernout & Hauspie to the short list, that would be considered an improvement, wouldn't it?

MR. POPEO: Object to the form.

THE DEPONENT: Yeah. It's an improvement.

MR. POPEO: Let's take our first break.

you were employed by Lernout & Hauspie, you may have had access to confidential information?

MR. POPEO: Object to the form.

THE DEPONENT: Well, the thing is, nobody ever told me this particular thing is confidential or is a trade secret or anything. And also, I don't remember any list or anything that says, well, look at these areas, even like more broad level, that these things would be confidential or trade secret. I don't even recall anything that says use your own judgment. So if -- again, I wasn't sure. So to me it was a very fuzzy thing.

BY MS. FLEMING:

Q. Did you ever ask?

A. I don't remember.

Q. You don't remember if you ever asked whether any of the work you worked on at Lernout & Hauspie was confidential?

A. It's likely that I did, but I don't remember. In any case -- but if I still thought that, you know, there must be something that's confidential, maybe. And I don't know

what it is. Nobody ever told me. But I'll treat it as such if I'm not sure.

Q. And that's, in fact, what you did, treat it as such?

A. Whenever I wasn't sure whether something was confidential, I said well, I treat it as confidential. I'm not going to disclose it.

Q. Did you work on short lists at Voice Signal Technologies?

A. No.

MR. POPEO: Object to the form of the question.

BY MS. FLEMING:

Q. Never?

A. No.

Q. Now, I direct your attention to paragraph 9 of this Exhibit 2, the agreement, on page VST 03743.

A. Yes.

Q. Paragraph 9 is subtitled, No Conflicting Obligation. Do you see that?

A. Yes.

Q. And you would agree with me that

obtained in the Voice Xpress project product of Lernout & Hauspie, if you know?

A. I don't remember how this worked in Voice Xpress.

Q. Do you remember how it worked in Phoenix?

A. I don't know the details about it because I did not implement the language model for Phoenix.

Q. Did you implement the language model for ELVIS?

MR. POPEO: Objection to form.

THE DEPONENT: No, I did not.

BY MS. FLEMING:

Q. Okay. How do you know then how the scores are obtained in ELVIS if you didn't implement the language model?

A. Because I wrote some code that used the language model.

Q. So you're familiar with the language model?

A. Yes. So I have to know what it's doing in order to use it.

Q. Did you write some code at Lernout &

Hauspie?

MR. POPEO: Any code?

THE DEPONENT: Any code that used language model?

BY MS. FLEMING:

Q. Yes.

A. Yes.

Q. You did?

A. Yeah.

Q. So did you have access to the language model in terms of how the scores were obtained?

MR. POPEO: Objection to form.

THE DEPONENT: I could have looked it up and probably did look at the code, but I don't remember the specifics about it.

BY MS. FLEMING:

Q. As you sit here today, you don't remember the specifics of how the scores were added up in the Phoenix project?

A. Right. I don't remember that, specifically how this worked.

Q. But you know it was different than how the -- Voice Signal implemented the language models?

faster.

But since building a tree -- I mean, again, it matters what the tree is. And I also maybe should clarify another thing, which is that the ELVIS recognizer did not build the tree out of the vocabulary during recognition -- or before recognition. I'm sorry.

BY MS. FLEMING:

Q. Okay. Before we get to that, though. You're moving onto another subject. I want to make sure I understand what you're saying. And I believe that you testified that there are ways to build the trees where it becomes faster to go through the vocabulary. Is that accurate?

MR. POPEO: Objection.

THE DEPONENT: Yes.

BY MS. FLEMING:

Q. And you built a lexical tree in connection with your work on the Phoenix project at Lernout & Hauspie, correct?

A. Yes.

Q. And you learned certain techniques

about how to build that lexical tree when you were at Lernout & Hauspie; is that correct?

MR. POPEO: Object to the form of the question. Assumes a fact not in evidence.

THE DEPONENT: Well, I did know how to build lexical trees when I started to work at L&H from my work at Philips.

BY MS. FLEMING:

Q. So you built lexical trees when you were at Philips?

A. Yes.

Q. And then you learned -- let me ask you this: Did you learn more about how to build lexical trees in a faster way at Lernout & Hauspie?

MR. POPEO: Object to the form of the question.

THE DEPONENT: I don't think so.

BY MS. FLEMING:

Q. Did you learn how to build lexical trees in a faster way when you were at Voice Signal Technologies?

A. No. And the reason is, at Voice Signal in the ELVIS recognizer, the tree was built

off-line. So it was not being processed on the cell phone or the embedded device. So ultimately, it doesn't matter how long it takes.

Q. But you built it?

A. I wrote the code that builds the lexical tree in the ELVIS.

Q. And you wrote the code that built the lexical tree for the Phoenix project?

MR. POPEO: Objection to form. Mischaracterizes testimony.

THE DEPONENT: Yes.

BY MS. FLEMING:

Q. You also said you wrote the code, you wrote the part of the code that was a module for searching the lexical tree?

A. Yes.

Q. Is that right?

Okay. Describe for me what that portion of the code accomplishes or what tasks does that accomplish?

MR. POPEO: Objection.

THE DEPONENT: Okay. So if you talk about a generic recognizer again, then the

CERTIFICATE

COMMONWEALTH OF MASSACHUSETTS

SUFFOLK, SS

I, Dana Welch, Registered Professional Reporter and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify:

That MANFRED G. GRABHERR, the witness whose deposition is hereinbefore set forth, was duly sworn by me and that such deposition is a true record of my stenotype notes taken in the foregoing matter, to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF, I have hereunto set my hand this 16th day of June, 2005.

DANA ULRICH WELCH

Dana Welch, RPR

Registered Professional Reporter